

*Abstract of the Disclosure*

A method of designing a fuel vapor pressure management apparatus that performs leak detection on a headspace of a fuel system. A pressure operable device separates the housing into first and second portions, and includes a seal and a poppet that cooperatively engages the seal with a contact force. The seal includes a first effective area that is equal to a difference between a first area defined by a major perimeter and a second area defined by a minor perimeter. The poppet moves along an axis and includes a second effective area that is defined by the minor perimeter of the seal. A first pressure level, at which excess negative pressure is relieved, is calculated by dividing the contact force by the first effective area. And a second pressure level, at which excess positive pressure is relieved, is calculated by dividing the activation force by the second effective area.